



# Linux Foundation

## CKS Exam

### Certified Kubernetes Security Specialist

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# Version: 6.0

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## Question: 1

---

Create a new ServiceAccount named backend-sa in the existing namespace default, which has the capability to list the pods inside the namespace default.

Create a new Pod named backend-pod in the namespace default, mount the newly created sa backend-sa to the pod, and Verify that the pod is able to list pods.

Ensure that the Pod is running.

---

**Answer: See the  
Explanation below:**

---

Explanation:

A service account provides an identity for processes that run in a Pod.

When you (a human) access the cluster (for example, using kubectl), you are authenticated by the apiserver as a particular User Account (currently this is usually admin, unless your cluster administrator has customized your cluster). Processes in containers inside pods can also contact the apiserver. When they do, they are authenticated as a particular Service Account (for example, default).

When you create a pod, if you do not specify a service account, it is automatically assigned the default service account in the same namespace. If you get the raw json or yaml for a pod you have created (for example, `kubectl get pods/<podname> -o yaml`), you can see the `spec.serviceAccountName` field has been [automatically set](#).

You can access the API from inside a pod using automatically mounted service account credentials, as described in [Accessing the Cluster](#). The API permissions of the service account depend on the [authorization plugin and policy](#) in use.

In version 1.6+, you can opt out of automounting API credentials for a service account by setting `automountServiceAccountToken: false` on the service account:

```
apiVersion: v1
kind: ServiceAccount
metadata:
  name: build-robot
automountServiceAccountToken: false
```

...

In version 1.6+, you can also opt out of automounting API credentials for a particular pod:

```
apiVersion: v1
kind: Pod
metadata:
  name: my-pod
```

spec:

```
serviceAccountName: build-robot
automountServiceAccountToken: false
```

...

The pod spec takes precedence over the service account if both specify a `automountServiceAccountToken` value.

---

## Question: 2

Fix all issues via configuration and restart the affected components to ensure the new setting takes effect.

Fix all of the following violations that were found against the API server:-

- a. Ensure the `--authorization-mode` argument includes RBAC
- b. Ensure the `--authorization-mode` argument includes Node
- c. Ensure that the `--profiling` argument is set to false

Fix all of the following violations that were found against the Kubelet:-

- a. Ensure the `--anonymous-auth` argument is set to false.
- b. Ensure that the `--authorization-mode` argument is set to Webhook.

Fix all of the following violations that were found against the ETCD:-

- a. Ensure that the `--auto-tls` argument is not set to true

Hint: Take the use of Tool Kube-Bench

---

**Answer: See the  
Explanation below.**

---

Explanation:

API server:

Ensure the `--authorization-mode` argument includes RBAC

Turn on Role Based Access Control.

Role Based Access Control (RBAC) allows fine-grained control over the operations that different entities can perform on different objects in the cluster. It is recommended to use the RBAC authorization mode.

Fix - Buildtime

Kubernetes

```
apiVersion: v1
```

```
kind: Pod
```

```
metadata:
```

```
  creationTimestamp: null
```

```
  labels:
```

```
    component: kube-apiserver
```

```
    tier: control-plane
```

```
  name: kube-apiserver
```

```
  namespace: kube-system
```

```
spec:
```

```
containers:
- command:
+ - kube-apiserver
+ --authorization-mode=RBAC,Node
image: gcr.io/google_containers/kube-apiserver-amd64:v1.6.0
livenessProbe:
  failureThreshold: 8
  httpGet:
    host: 127.0.0.1
    path: /healthz
    port: 6443
    scheme: HTTPS
  initialDelaySeconds: 15
  timeoutSeconds: 15
name: kube-apiserver-should-pass
resources:
  requests:
    cpu: 250m
volumeMounts:
- mountPath: /etc/kubernetes/
  name: k8s
  readOnly: true
- mountPath: /etc/ssl/certs
  name: certs
- mountPath: /etc/pki
  name: pki
hostNetwork: true
volumes:
- hostPath:
  path: /etc/kubernetes
  name: k8s
- hostPath:
  path: /etc/ssl/certs
  name: certs
- hostPath:
  path: /etc/pki
  name: pki
```

Ensure the --authorization-mode argument includes Node

Remediation: Edit the API server pod specification file `/etc/kubernetes/manifests/kube-apiserver.yaml` on the master node and set the --authorization-mode parameter to a value that includes Node.

```
--authorization-mode=Node,RBAC
```

Audit:

```
/bin/ps -ef | grep kube-apiserver | grep -v grep
```

Expected result:

```
'Node,RBAC' has 'Node'
```

Ensure that the `--profiling` argument is set to false

Remediation: Edit the API server pod specification file `/etc/kubernetes/manifests/kube-apiserver.yaml` on the master node and set the below parameter.

```
--profiling=false
```

Audit:

```
/bin/ps -ef | grep kube-apiserver | grep -v grep
```

Expected result:

```
'false' is equal to 'false'
```

Fix all of the following violations that were found against the Kubelet:-

Ensure the `--anonymous-auth` argument is set to false.

Remediation: If using a Kubelet config file, edit the file to set authentication: anonymous: enabled to false. If using executable arguments, edit the kubelet service file `/etc/systemd/system/kubelet.service.d/10-kubeadm.conf` on each worker node and set the below parameter in `KUBELET_SYSTEM_PODS_ARGS` variable.

```
--anonymous-auth=false
```

Based on your system, restart the kubelet service. For example:

```
systemctl daemon-reload
```

```
systemctl restart kubelet.service
```

Audit:

```
/bin/ps -fC kubelet
```

Audit Config:

```
/bin/cat /var/lib/kubelet/config.yaml
```

Expected result:

```
'false' is equal to 'false'
```

2) Ensure that the `--authorization-mode` argument is set to Webhook.

Audit

```
docker inspect kubelet | jq -e '[0].Args[] | match("--authorization-mode=Webhook").string'
```

Returned Value: `--authorization-mode=Webhook`

Fix all of the following violations that were found against the ETCD:-

a. Ensure that the `--auto-tls` argument is not set to true

Do not use self-signed certificates for TLS. etcd is a highly-available key value store used by Kubernetes deployments for persistent storage of all of its REST API objects. These objects are sensitive in nature and should not be available to unauthenticated clients. You should enable the client authentication via valid certificates to secure the access to the etcd service.

Fix - Buildtime

Kubernetes

apiVersion: v1

kind: Pod

metadata:

annotations:

  scheduler.alpha.kubernetes.io/critical-pod: ""

creationTimestamp: null

labels:

```
component: etcd
tier: control-plane
name: etcd
namespace: kube-system
spec:
  containers:
  - command:
+ - etcd
+ - --auto-tls=true
    image: k8s.gcr.io/etcd-amd64:3.2.18
    imagePullPolicy: IfNotPresent
    livenessProbe:
      exec:
        command:
        - /bin/sh
        - -ec
        - ETCDCTL_API=3 etcdctl --endpoints=https://[192.168.22.9]:2379 --
cacert=/etc/kubernetes/pki/etcd/ca.crt
        --cert=/etc/kubernetes/pki/etcd/healthcheck-client.crt --
key=/etc/kubernetes/pki/etcd/healthcheck-client.key
        get foo
      failureThreshold: 8
      initialDelaySeconds: 15
      timeoutSeconds: 15
    name: etcd-should-fail
    resources: {}
    volumeMounts:
    - mountPath: /var/lib/etcd
      name: etcd-data
    - mountPath: /etc/kubernetes/pki/etcd
      name: etcd-certs
  hostNetwork: true
  priorityClassName: system-cluster-critical
  volumes:
  - hostPath:
    path: /var/lib/etcd
    type: DirectoryOrCreate
    name: etcd-data
  - hostPath:
    path: /etc/kubernetes/pki/etcd
    type: DirectoryOrCreate
    name: etcd-certs
status: {}
```

Explanation:

```

candidate@cli:~$ kubectl delete sa/podrunner -n qa
serviceaccount "podrunner" deleted
candidate@cli:~$ kubectl config use-context KSCS00201
Switched to context "KSCS00201".
candidate@cli:~$ ssh kscs00201-master
Warning: Permanently added '10.240.86.194' (ECDSA) to the list of known hosts.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@kscs00201-master:~# vim /etc/kubernetes/manifests/kube-apiserver.yaml
root@kscs00201-master:~# systemctl daemon-reload
root@kscs00201-master:~# systemctl restart kubelet.service
root@kscs00201-master:~# systemctl enable kubelet.service
root@kscs00201-master:~# systemctl status kubelet.service
● kubelet.service - kubelet: The Kubernetes Node Agent
   Loaded: loaded (/lib/systemd/system/kubelet.service; enabled; vendor preset: enabled)
   Drop-In: /etc/systemd/system/kubelet.service.d
            └─10-kubeadm.conf
   Active: active (running) since Fri 2022-05-20 14:19:31 UTC; 29s ago
     Docs: https://kubernetes.io/docs/home/
   Main PID: 134205 (kubelet)
    Tasks: 16 (limit: 76200)
   Memory: 39.5M
   CGroup: /system.slice/kubelet.service
            └─134205 /usr/bin/kubelet --bootstrap-kubeconfig=/etc/kubernetes/bootstrap-kub
May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420825 134205 reconciler.>
May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420863 134205 reconciler.>
May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420907 134205 reconciler.>
May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420928 134205 reconciler.>
May 20 14:19:36 kscs00201-master kubelet[134205]: I0520 14:19:36.572353 134205 request.go:>
May 20 14:19:37 kscs00201-master kubelet[134205]: I0520 14:19:37.112347 134205 prober_mana>
May 20 14:19:37 kscs00201-master kubelet[134205]: E0520 14:19:37.185076 134205 kubelet.go:>
May 20 14:19:37 kscs00201-master kubelet[134205]: I0520 14:19:37.645798 134205 kubelet.go:>
May 20 14:19:38 kscs00201-master kubelet[134205]: I0520 14:19:38.184062 134205 kubelet.go:>
May 20 14:19:40 kscs00201-master kubelet[134205]: I0520 14:19:40.036042 134205 prober_mana>
lines 1-22/22 (END)

de Agent
et.service; enabled; vendor preset: enabled)
ce.d

5-20 14:19:31 UTC; 29s ago

trap-kubeconfig=/etc/kubernetes/bootstrap-kubelet.conf --kubeconfig=/etc/kubernetes/kubelet
5]: I0520 14:19:35.420825 134205 reconciler.go:221] "operationExecutor.VerifyControllerAtt>
5]: I0520 14:19:35.420863 134205 reconciler.go:221] "operationExecutor.VerifyControllerAtt>
5]: I0520 14:19:35.420907 134205 reconciler.go:221] "operationExecutor.VerifyControllerAtt>
5]: I0520 14:19:35.420928 134205 reconciler.go:157] "Reconciler: start to sync state"
5]: I0520 14:19:36.572353 134205 request.go:665] Waited for 1.049946364s due to client-sid>
5]: I0520 14:19:37.112347 134205 prober_manager.go:255] "Failed to trigger a manual run" p>
5]: E0520 14:19:37.185076 134205 kubelet.go:1711] "Failed creating a mirror pod for" err=">
5]: I0520 14:19:37.645798 134205 kubelet.go:1693] "Trying to delete pod" pod="kube-system/>
5]: I0520 14:19:38.184062 134205 kubelet.go:1698] "Deleted mirror pod because it is outdat>
5]: I0520 14:19:40.036042 134205 prober_manager.go:255] "Failed to trigger a manual run" p>
~
~
lines 1-22/22 (END)

```

```
let.conf --kubeconfig=/etc/kubernetes/kubelet.conf --config=/var/lib/kubelet/config.yaml -->
o:221] "operationExecutor.VerifyControllerAttachedVolume started for volume \"kube-proxy\" >
o:221] "operationExecutor.VerifyControllerAttachedVolume started for volume \"lib-modules\">
o:221] "operationExecutor.VerifyControllerAttachedVolume started for volume \"flannel-cfg\">
o:157] "Reconciler: start to sync state"
65] Waited for 1.049946364s due to client-side throttling, not priority and fairness, reques>
er.go:255] "Failed to trigger a manual run" probe="Readiness"
711] "Failed creating a mirror pod for" err="pods \"kube-apiserver-kscs00201-master\" alrea>
693] "Trying to delete pod" pod="kube-system/kube-apiserver-kscs00201-master" podUID=bb91e1>
698] "Deleted mirror pod because it is outdated" pod="kube-system/kube-apiserver-kscs00201->
er.go:255] "Failed to trigger a manual run" probe="Readiness"
~
~
root@kscs00201-master:~# vim /var/lib/kubelet/config.yaml
apiVersion: kubelet.config.k8s.io/v1beta1
authentication:
  anonymous:
    enabled: false
  webhook:
    cacheTTL: 0s
    enabled: true
  x509:
    clientCAFile: /etc/kubernetes/pki/ca.crt
authorization:
  mode: Webhook
  webhook:
    cacheAuthorizedTTL: 0s
    cacheUnauthorizedTTL: 0s
cgroupDriver: systemd
clusterDNS:
~
~
root@kscs00201-master:~# vim /var/lib/kubelet/config.yaml
root@kscs00201-master:~# vim /var/lib/kubelet/config.yaml
root@kscs00201-master:~# vim /etc/kubernetes/manifests/etcd.yaml
root@kscs00201-master:~# systemctl daemon-reload
root@kscs00201-master:~# systemctl restart kubelet.service
root@kscs00201-master:~# systemctl status kubelet.service
```



```

• kubelet.service - kubelet: The Kubernetes Node Agent
  Loaded: loaded (/lib/systemd/system/kubelet.service; enabled; vendor preset: enabled)
  Drop-In: /etc/systemd/system/kubelet.service.d
           └─10-kubeadm.conf
  Active: active (running) since Fri 2022-05-20 14:22:29 UTC; 4s ago
  Docs: https://kubernetes.io/docs/home/
  Main PID: 135849 (kubelet)
  Tasks: 17 (limit: 76200)
  Memory: 38.0M
  CGroup: /system.slice/kubelet.service
           └─135849 /usr/bin/kubelet --bootstrap-kubeconfig=/etc/kubernetes/bootstrap-kub
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330232 135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330259 135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330304 135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330354 135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330378 135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330397 135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330415 135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330433 135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330452 135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330463 135849 reconciler.>
lines 1-22/22 (END)
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330463 135849 reconciler.>
root@kscs00201-master:~#
root@kscs00201-master:~#
root@kscs00201-master:~#
root@kscs00201-master:~# exit
logout
Connection to 10.240.86.194 closed.
candidate@cli:~$

```

---

### Question: 3

---

Create a PSP that will prevent the creation of privileged pods in the namespace.  
 Create a new PodSecurityPolicy named prevent-privileged-policy which prevents the creation of privileged pods.  
 Create a new ServiceAccount named psp-sa in the namespace default.  
 Create a new ClusterRole named prevent-role, which uses the newly created Pod Security Policy prevent-privileged-policy.  
 Create a new ClusterRoleBinding named prevent-role-binding, which binds the created ClusterRole prevent-role to the created SA psp-sa.  
 Also, Check the Configuration is working or not by trying to Create a Privileged pod, it should get failed.

---

**Answer: See the  
Explanation below.**

---

Explanation:

Create a PSP that will prevent the creation of privileged pods in the namespace.

```
$ cat clusterrole-use-privileged.yaml
```

```
---
```

```
apiVersion: rbac.authorization.k8s.io/v1
```

```
kind: ClusterRole
```

<https://www.certkillers.net>

```

metadata:
  name: use-privileged-pp
rules:
- apiGroups: ['policy']
  resources: ['podsecuritypolicies']
  verbs: ['use']
  resourceNames:
  - default-pp
---
apiVersion: rbac.authorization.k8s.io/v1
kind: RoleBinding
metadata:
  name: privileged-role-bind
  namespace: psp-test
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: ClusterRole
  name: use-privileged-pp
subjects:
- kind: ServiceAccount
  name: privileged-sa
$ kubectl -n psp-test apply -f clusterrole-use-privileged.yaml
After a few moments, the privileged Pod should be created.

```

Create a new PodSecurityPolicy named prevent-privileged-policy which prevents the creation of privileged pods.

```

apiVersion: policy/v1beta1
kind: PodSecurityPolicy
metadata:
  name: example
spec:
  privileged: false # Don't allow privileged pods!
  # The rest fills in some required fields.
  seLinux:
    rule: RunAsAny
  supplementalGroups:
    rule: RunAsAny
  runAsUser:
    rule: RunAsAny
  fsGroup:
    rule: RunAsAny
  volumes:
  - '*'

```

And create it with kubectl:  
 kubectl-admin create -f example-pp.yaml  
 Now, as the unprivileged user, try to create a simple pod:

<https://www.certkillers.net>

```
kubectl-user create -f- <<EOF
apiVersion: v1
kind: Pod
metadata:
  name: pause
spec:
  containers:
  - name: pause
    image: k8s.gcr.io/pause
EOF
```

The output is similar to this:

```
Error from server (Forbidden): error when creating "STDIN": pods "pause" is forbidden: unable to
validate against any pod security policy: []
```

Create a new ServiceAccount named psp-sa in the namespace default.

```
$ cat clusterrole-use-privileged.yaml
---
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
  name: use-privileged-osp
rules:
- apiGroups: ['policy']
  resources: ['podsecuritypolicies']
  verbs: ['use']
  resourceNames:
  - default-osp
---
apiVersion: rbac.authorization.k8s.io/v1
kind: RoleBinding
metadata:
  name: privileged-role-bind
  namespace: psp-test
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: ClusterRole
  name: use-privileged-osp
subjects:
- kind: ServiceAccount
  name: privileged-sa
```

```
$ kubectl -n psp-test apply -f clusterrole-use-privileged.yaml
```

After a few moments, the privileged Pod should be created.

Create a new ClusterRole named prevent-role, which uses the newly created Pod Security Policy prevent-privileged-policy.

```
apiVersion: policy/v1beta1
```

```

kind: PodSecurityPolicy
metadata:
  name: example
spec:
  privileged: false # Don't allow privileged pods!
  # The rest fills in some required fields.
  seLinux:
    rule: RunAsAny
  supplementalGroups:
    rule: RunAsAny
  runAsUser:
    rule: RunAsAny
  fsGroup:
    rule: RunAsAny
  volumes:
    - '*'

```

And create it with kubectl:

```
kubectl-admin create -f example-ppsp.yaml
```

Now, as the unprivileged user, try to create a simple pod:

```
kubectl-user create -f- <<EOF
```

```

apiVersion: v1
kind: Pod
metadata:
  name: pause
spec:
  containers:
  - name: pause
    image: k8s.gcr.io/pause
EOF

```

EOF

The output is similar to this:

```
Error from server (Forbidden): error when creating "STDIN": pods "pause" is forbidden: unable to
validate against any pod security policy: []
```

Create a new ClusterRoleBinding named prevent-role-binding, which binds the created ClusterRole prevent-role to the created SA psp-sa.

```

apiVersion: rbac.authorization.k8s.io/v1
# This role binding allows "jane" to read pods in the "default" namespace.
# You need to already have a Role named "pod-reader" in that namespace.
kind: RoleBinding
metadata:
  name: read-pods
  namespace: default
subjects:
# You can specify more than one "subject"
- kind: User
  name: jane # "name" is case sensitive
apiGroup: rbac.authorization.k8s.io

```

roleRef:

# "roleRef" specifies the binding to a Role / ClusterRole

kind: Role #this must be Role or ClusterRole

name: pod-reader # this must match the name of the Role or ClusterRole you wish to bind to

apiGroup: rbac.authorization.k8s.io

apiVersion: rbac.authorization.k8s.io/v1

kind: Role

metadata:

namespace: default

name: pod-reader

rules:

- apiGroups: ["" ] # "" indicates the core API group

resources: ["pods"]

verbs: ["get", "watch", "list"]

---

**Question: 4**

---

You **must** complete this task on the following cluster/nodes:



Cluster	Master node	Worker node
KSCH00201	ksch00201-master	ksch00201-worker1

You can switch the cluster/configuration context using the following command:

```
[candidate@cli] $ | kubectl config use-context KSCH00201
```

### Context

A Role bound to a Pod's ServiceAccount grants overly permissive permissions. Complete the following tasks to reduce the set of permissions.

### Task

Given an existing Pod named web-pod running in the namespace security.

<https://www.certkillers.net>

Edit the existing Role bound to the Pod's ServiceAccount sa-dev-1 to only allow performing watch operations, only on resources of type services.

Create a new Role named role-2 in the namespace security, which only allows performing update operations, only on resources of type namespaces.

Create a new RoleBinding named role-2-binding binding the newly created Role to the Pod's ServiceAccount.

Don't delete the existing  
RoleBinding.




---

**Answer: See  
explanation below.**

---

Explanation:

```
candidate@cli:~$ kubectl config use-context KSCH00201
Switched to context "KSCH00201".
candidate@cli:~$ kubectl get pods -n security
NAME      READY   STATUS    RESTARTS   AGE
web-pod   1/1     Running   0           6h9m
candidate@cli:~$ kubectl get deployments.apps -n security
No resources found in security namespace.
candidate@cli:~$ kubectl describe rolebindings.rbac.authorization.k8s.io -n security
Name:      dev-role
Labels:    <none>
Annotations: <none>
Role:
  Kind: Role
  Name: dev-role
Subjects:
  Kind      Name      Namespace
  ----      -
  ServiceAccount sa-dev-1
candidate@cli:~$ kubectl describe role dev-role -n security
Name:      dev-role
Labels:    <none>
Annotations: <none>
PolicyRule:
  Resources  Non-Resource URLs  Resource Names  Verbs
  ----      -
  *          []                 []              [*]
candidate@cli:~$ kubectl edit role/dev-role -n security
```

```

uid: b4c9ddd6-2729-43bd-8fbd-b2d227f4c4cd
rules:
- apiGroups:
  - ""
  resources:
  - services
  verbs:
  - watch

candidate@cli:~$ kubectl describe role dev-role -n security
Name:          dev-role
Labels:        <none>
Annotations:   <none>
PolicyRule:
  Resources      Non-Resource URLs  Resource Names  Verbs
  -----
  *              []                 []              [*]

candidate@cli:~$ kubectl edit role/dev-role -n security
role.rbac.authorization.k8s.io/dev-role edited
candidate@cli:~$ kubectl describe role dev-role -n security
Name:          dev-role
Labels:        <none>
Annotations:   <none>
PolicyRule:
  Resources      Non-Resource URLs  Resource Names  Verbs
  -----
  services       []                 []              [watch]

candidate@cli:~$ kubectl get pods -n security
NAME          READY   STATUS    RESTARTS   AGE
web-pod       1/1     Running   0           6h12m

candidate@cli:~$ kubectl get pods/web-pod -n security -o yaml | grep serviceAccount
serviceAccount: sa-dev-1
serviceAccountName: sa-dev-1
- serviceAccountToken:

candidate@cli:~$ kubectl create role role-2 --verb=update --resource=namespaces -n security
role.rbac.authorization.k8s.io/role-2 created
candidate@cli:~$ kubectl create rolebinding role-2-binding --role
--role --role=
candidate@cli:~$ kubectl create rolebinding role-2-binding --role=role-2 --serviceaccount=se
curity:sa-dev-1 -n security
rolebinding.rbac.authorization.k8s.io/role-2-binding created
candidate@cli:~$

```

---

## Question: 5

---

Enable audit logs in the cluster, To Do so, enable the log backend, and ensure that

1. logs are stored at /var/log/kubernetes-logs.txt.
2. Log files are retained for 12 days.
3. at maximum, a number of 8 old audit logs files are retained.

4. set the maximum size before getting rotated to 200MB

Edit and extend the basic policy to log:

1. namespaces changes at RequestResponse
2. Log the request body of secrets changes in the namespace kube-system.
3. Log all other resources in core and extensions at the Request level.
4. Log "pods/portforward", "services/proxy" at Metadata level.
5. Omit the Stage RequestReceived



All other requests at the Metadata level

---

**Answer: See the explanation below:**

---

Explanation:

Kubernetes auditing provides a security-relevant chronological set of records about a cluster. Kube-apiserver performs auditing. Each request on each stage of its execution generates an event, which is then pre-processed according to a certain policy and written to a backend. The policy determines what's recorded and the backends persist the records.

You might want to configure the audit log as part of compliance with the CIS (Center for Internet Security) Kubernetes Benchmark controls.

The audit log can be enabled by default using the following configuration in cluster.yml:  
services:

```
  kube-api:
    audit_log:
      enabled: true
```

When the audit log is enabled, you should be able to see the default values at /etc/kubernetes/audit-policy.yml

The log backend writes audit events to a file in [JSONlines](#) format. You can configure the log audit backend using the following kube-apiserver flags:

--audit-log-path specifies the log file path that log backend uses to write audit events. Not specifying this flag disables log backend. - means standard out

--audit-log-maxage defined the maximum number of days to retain old audit log files

--audit-log-maxbackup defines the maximum number of audit log files to retain

--audit-log-maxsize defines the maximum size in megabytes of the audit log file before it gets rotated

If your cluster's control plane runs the kube-apiserver as a Pod, remember to mount the hostPath to the location of the policy file and log file, so that audit records are persisted. For example:

```
--audit-policy-file=/etc/kubernetes/audit-policy.yml \
--audit-log-path=/var/log/audit.log
```

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